

Four new Serranid Fishes of the genus *Epinephelus* (Perciformes: Epinephelinae) from Western Australia

John E. Randall* and Gerald R. Allen†

Abstract

Four new species of serranid fishes are described from northern Western Australia. *Epinephelus stictus* is named from six specimens (four from the South China Sea) collected by trawling. It is similar to *E. diacanthus* Valenciennes and *E. sexfasciatus* Valenciennes with which it shares two greatly enlarged serrae at the corner of the preopercle; *E. stictus* is distinctive in having numerous dark brown dots dorsally on the head and anterodorsally on the body. *E. timorensis* (one specimen) and *E. trophis* (two specimens) were obtained from 130 m at the base of an experimental drilling rig at Dillon Shoals in the Timor Sea. *E. timorensis* was blue-grey with yellow spots on the head and body and faint dark spots posteriorly on the body, caudal fin, and soft portions of the dorsal and anal fins. *E. trophis* is distinctive in its high lateral-line scale count (67-69), deep body (depth 2.45 in SL) and uniform brown colour. *E. bilobatus* is represented by five specimens taken off Western Australia between latitudes 16 and 21° S; it is closely related to the dark spotted, Western Pacific *E. maculatus* (Bloch), differing in usually having 16 instead of 17 dorsal soft rays, fewer scales in longitudinal series, fewer gill rakers, and in its possession of three, large, bilobed, dark brown spots or close-set pairs of spots along the base of the dorsal fin.

Introduction

The serranid fishes of the subfamily Epinephelinae, widely known as groupers (gropers or rock cods in Australia), are among the most important food fishes of inshore waters in the tropical and subtropical regions of the world. They are usually associated with coral reefs or rocky substrata, though some species are taken by trawling on open sedimentary bottoms. Depending on the species, they occur from shallow water to 300 m or more. The adult size varies from less than 20 cm TL to at least 270 cm. Larger species are major predators at or near the top of food chains, feeding principally on fishes and crustaceans.

Because groupers are readily caught by hook and line, they were available to early naturalists who made collections of marine animals throughout the world. One would expect, therefore, that the classification of the group would be essentially complete by now. It has approached the definitive level for the New World

* Division of Ichthyology, Bernice P. Bishop Museum, P.O. Box 19000-A, Honolulu, Hawaii 96817, USA.

† Department of Ichthyology, Western Australian Museum, Francis Street, Perth, Western Australia 6000.

Epinephelinae, but taxonomic problems remain for the Indo-Pacific region. Randall (1987) recognised 99 species among 11 genera in a preliminary synopsis of Indo-Pacific members of the subfamily. The largest genus is *Epinephelus* with 63 valid named species in the Indo-Pacific and at least seven additional undescribed species. The purpose of the present paper is to name four of these new fishes which occur off Western Australia. Two were taken from an experimental drilling rig temporarily stationed at Dillon Shoals in the Timor Sea. After a number of weeks the operation ceased and the drill was slowly lifted from the seabed (130 m) over a period of several hours. Evidently many of the fishes living around the drill shaft followed it towards the surface, eventually floating upwards because of expansion of their gas bladders. The specimens were netted on the surface in the open centre section of the drilling barge by Lynn Harris, the vessel's medical officer. The third species is described from six specimens collected off north-western Australia, Hong Kong, and the South China Sea; it also occurs in relatively deep water. Twenty-seven species of *Epinephelus* are currently known from West Australian seas. Many of these were reported and/or illustrated for the first time from this area in the recent works of Gloerfelt-Tarp and Kailola (1984), Sainsbury, Kailola, and Leyland (1985), Allen (1985), and Allen and Russell (1986). A key is presented below to these 27 species, including the four species described herein.

We have reidentified the figure of *E. magniscuttis* in Gloerfelt-Tarp and Kailola (1984) as *E. epistictus* and also their figures of *E. malabaricus* and *E. tauvina* as *E. suillus*. Three *Epinephelus* names in Sainsbury *et al.* were corrected in their separate addendum as follows: *E. malabaricus* = *suillus*, *E. rankini* = *multinotatus*, and *E. homosinensis* = *rivulatus*. *Promicrops lanceolatus* of Allen (1985) and many other authors is here classified in *Epinephalus*. Mention should be made of the small grouper from 132 m off Barrow Island identified as *Cephalopholis* sp. by Allen (1985: fig. 118). This is one of a series of four specimens, WAM P26175-008, 36.55 mm SL. We tentatively identify this fish as *C. sonnerati* (Valenciennes, 1828). The meristic data, including the high lateral-line scale counts of 68-75, are the same as found in *sonnerati*; the body proportions and other morphological characters seem correct as well. The mottled pink colour is unusual, but we have no specimens of *sonnerati* this small or from this depth for comparison. Kyushin *et al.* (1977) recorded *C. sonnerati* from 22-110 m at several Indian Ocean localities. Their colour illustration of a 312-mm specimen is correctly identified as *sonnerati*, but their figure of a 124-mm specimen is *C. nigripinnis* (Valenciennes, 1828).

Materials and methods

The length given for specimens is standard length (SL); this is the straight-line measurement from the front of the upper lip (with the upper jaw pushed back if protruded) to the base of the caudal fin (end of hypural plate). Head length and snout length are taken from the same anterior point, the former to the posterior end of the opercular membrane and the latter to the fleshy edge of the orbit.

Body depth is the greatest depth from the base of the dorsal fin, adjusting for any malformation of preservation; body width is the maximum width just posterior to the gill opening. Orbit diameter is the greatest fleshy diameter; the interorbital width is the least fleshy width. Maxilla depth is the greatest depth of the expanded posterior end of the bone plus the supramaxilla. Caudal peduncle depth is the least depth, and caudal peduncle length is the horizontal distance from the posterior of the anal fin base to the caudal-fin base. The lengths of the spines and rays of the median fins are measured to their extreme bases (for which radiographs are helpful). The pectoral-fin length is the length of the longest ray; pelvic-fin lengths are measured from the base of the spine to the tip of the longest ray.

The last dorsal and anal rays, though divided to the base, are counted as one ray. Pectoral-ray counts include the uppermost rudimentary ray. Lateral-line scale counts are made from the upper end of the gill opening to the base of the caudal fin. The longitudinal scale series is the number of diagonal rows of scales counted just above the lateral line to the caudal-fin base. Gill-raker counts are made on the first gill arch and include all rudiments; the raker at the angle is contained in the lower-limb count.

Type specimens of the new species are deposited at the following institutions: Bernice P. Bishop Museum, Honolulu (BPBM); Division of Fisheries and Oceanography, Commonwealth Science and Industrial Research Organisation, Hobart (CSIRO), Western Australian Museum, Perth (WAM); and Department of Zoology, University Museum, University of Tokyo (ZUMT; ABE, the latter indicates the private collection of Tokiharu Abe).

In the descriptions below, data in parentheses refer to paratypes. Proportional measurements are given in the tables as percentages of the standard length. Many of these proportions are also presented in the text as quotients of larger measurements such as standard length and head length; these are rounded to the nearest 0.05.

Systematics

Key to the species of *Epinephelus* from Western Australia

- 1a Caudal fin emarginate to truncate 2
- 1b Caudal fin rounded 4
- 2a Membranes of spinous portion of dorsal fin incised; lateral line scales 49-53; depth 2.9-3.3 in SL; caudal fin emarginate to truncate; colour whitish with numerous, small, brown to yellowish brown spots 3
- 2b Membranes of spinous portion of dorsal fin not incised; lateral-line scales 64-80; body depth 2.6-3.0 in SL; caudal fin truncate; purplish grey with irregular, whitish spots and blotches and numerous, small, brown spots (Indian Ocean) *E. multinotatus* (Peters, 1876)

- 3a Anal fin rounded to slightly angular, the longest rays 2.0-2.6 in head; dorsal soft rays usually 16; pectoral fins relatively long, 1.6-1.8 in head; lower-limb gill rakers 14-16 (usually 15) (Red Sea and East Africa to western Pacific) *E. areolatus* (Forsskal, 1775)
- 3b Anal fin angular, the longest rays 1.85-2.3 in head; dorsal soft rays usually 17, pectoral fins not long, 1.7-2.0 in head; lower-limb gill rakers 15-18 (usually 16 or 17) (Red Sea and East Africa to the western Pacific) *E. chlorostigma* (Valenciennes, 1828)
- 4a Anal soft rays 9 (rarely 10); one to four spines on lower margin of preopercle separated from the enlarged spinules of the preopercular angle; brown with seven or eight broad dark bars on body, the one on caudal peduncle broadest and darkest, especially dorsally (Indo-Pacific, in deep water) *E. septemfasciatus* (Thunberg, 1793)
- 4b Anal soft rays 8 (rarely 7 or 9); no spines on lower margin of preopercle; colour not as in 4a. 5
- 5a Dorsal soft rays 12-13; young with two, broad, longitudinal, black-edged whitish bands that disappear in adults, the dark edges in adults first breaking into dashes and spots (Red Sea to southern Japan) *E. latifasciatus* (Temminck and Schlegel, 1842)
- 5b Dorsal soft rays 14-18 (except *radiatus*, rarely with 13); colour not as in 3a 6
- 6a Lateral-line scales with branched tubules; cyc very small, varying from about 8 in head of 20 cm SL individuals to about 9 for 35 cm ones, and 13 for 145 cm fish; maximum total length about 270 cm (Indo-Pacific) *E. lanceolatus* (Bloch, 1790)
- 6b Lateral-line scales with a single tubule (except large *E. suillus*); eye not very small, less than 7 in head for 20 cm individuals and less than 8 for 35 cm ones; maximum total length less than 150 cm. 7
- 7a Head, body, and fins with numerous, small, dark spots. 8
- 7b Dark spots, if present, not numerous and not on head, body, and fins 18
- 8a Lateral-line scales 47-52 9
- 8b Lateral-line scales 52-74 12
- 9a Longitudinal scale series 86-96; pectoral fins relatively long, 1.2-1.5 in head; two diagonal dark bands on thorax anterior to pectoral-fin base (uppermost band may consist of two elongate dark spots) (western Pacific to south-west Thailand and Western Australia) *E. quoyanus* (Valenciennes, 1830)
- 9b Longitudinal scale series 94-120; pectoral fins not long, 1.5-1.95 in head; no diagonal dark bands on thorax 10

- 10a Longest dorsal spine 2.05-2.30 in head; three, large, bilobed or close-set pairs of spots along base of dorsal fin; dark spots on pectoral fins moderate to large, approaching pupil diameter in size, (Western Australia).
 *E. bilobatus*, new species
- 10b Longest dorsal spine 2.7-3.3 in head; no large dark brown or blackish area anteriorly in dorsal fin; dark spots on pectoral fins small11
- 11a Dorsal soft rays 15-17 (usually 16); gill rakers 21-24; no black, saddle-like spot on caudal peduncle; spots on body dark brown, larger than pupil, round to hexagonal, and close-set (some merging to form short bands) (Indo-Pacific)*E. merra* Bloch, 1793
- 11b Dorsal soft rays 14-15; gill rakers 24-27; a black, saddle-like spot dorsally on caudal peduncle; numerous, very small, blackish spots on body superimposed on a pattern of large brown blotches (Indo-Pacific).
 *E. microdon* (Bleeker, 1856)
- 12a Most dark spots on body polygonal and very close-set, only narrow pale lines or white dots separating individual spots.13
- 12b Most dark spots on body round or oblong and well-separated.14
- 13a Second anal spine relatively long, 2.10-2.35 in head; longest dorsal spine 2.55-2.90 in head; dorsal soft rays usually 16; dark spots of head and body merging or tending to merge, separated mainly by white dots at angular corners of spots; a series of five dark blotches along back; a large yellow-brown spot behind eye sometimes linked to but usually separate from another horizontally elongate spot of the same colour on opercle (Indo-Pacific)
 *E. hexagonatus* (Schneider, 1801)
- 13b Second anal spine not long, 2.75-3.55 in head; longest dorsal spine 2.9-3.5 in head; dorsal soft rays usually 15; dark spots on head and body fully separated by a network of pale lines; a single large black spot on back at rear base of spinous portion of dorsal fin; no large yellow-brown spot behind eye or on opercle (East Africa to the Line Islands and Phoenix Islands)
 *E. melanostigma* Schultz, 1953
- 14a Lateral-line scales 52-6515
- 14b Lateral-line scales 65-7417
- 15a Gill rakers 29-31; posterior nostril subtriangular, more than four times larger in greatest dimension than anterior nostril in large adults; body depth 2.6-3.1 in SL; light yellowish brown with large, irregular, blotches on head and body, and numerous small dark brown spots on head, body, and fins; a saddle-like black spot on caudal peduncle (Indo-Pacific)
 *E. fuscoguttatus* (Forsskål, 1775)

- 15b Gill rakers 23-29; nostrils subequal or posterior nostril enlarged but vertically elongate; body depth 2.7-3.8 in SL; dark spots on head and body not very small and not close-set; no black spot dorsally on caudal peduncle 16
- 16a Pectoral fins 1.50-1.75 in head; posterior nostril of adults vertically elongate, its length two to three times longer than diameter of anterior nostril; tubules of lateral-line scales simple; body depth 2.7-3.2 in SL; no obvious dark bars on body (a large dusky to blackish spot containing two or more black spots on back below rear of spinous portion of dorsal fin and two lesser dusky spots at base of soft portion of fin); maximum length 32 cm (Western Australia, Queensland to Taiwan) *E. corallicola* (Valenciennes, 1828)
- 16b Pectoral fins 1.75-2.25 in SL; posterior nostril not vertically elongate; tubules of anterior lateral-line scales of large adults branched; body depth 3.1-3.8 in SL; body with five diagonal dark bars (sometimes broken and/or faint) that bifurcate ventrally; maximum length at least 100 cm (Indo-Pacific) *E. suillus* (Valenciennes, 1828)
- 17a Longitudinal scale series 98-113; scales on body mainly cycloid; auxiliary scales present; lower-limb gill rakers 18-20; pale with numerous, well-spaced, orange-red to dark brown spots on body, and five larger dusky spots on back (Indo-Pacific) *E. tauvina* (Forsskål, 1775)
- 17b Longitudinal scale series 113-135; scales on body ctenoid; no auxiliary scales present; lower-limb gill rakers 16-19; brown to grey with large, round to horizontally elliptical dark brown spots in four or five rows on body and smaller dark brown spots on head and fins (East Africa to western Pacific) *E. tukula* (Morgans, 1959)
- 18a Head and body dark with numerous, small, whitish spots, and often with large whitish blotches as well (small pale spots on head and nape of *timorensis* but dark spots posteriorly on body) 19
- 18b Head and body without small whitish spots and larger blotches 20
- 19a Pectoral rays 15-17 (rarely 17); lateral-line scales 48-53; two or three rows of teeth on midside of lower jaw; nostrils subequal; whitish spots in adults coalesced to form irregular longitudinal bands (Indian Ocean to western Pacific and Caroline Islands) *E. ongus* (Bloch, 1790)
- 19b Pectoral rays 17-19 (usually 18); lateral-line scales 51-61; three to five rows of teeth on midside of lower jaw; posterior nostril of adults vertically elongate, its length 2-4 times that of diameter of anterior nostril; whitish spots not coalesced to form longitudinal bands (Indian Ocean to central Pacific) *E. caeruleopunctatus* (Bloch, 1790)
- 20a Corner of preopercle with one to four (usually two) very large serrae (generally three or more times longer than lowermost serrae of posterior preopercular margin) 21

- 20b Corner of preopercle with slightly to moderately enlarged serrae (large on *E. epistictus*, *heniochus* and *radiatus*, but not three times longer than serrae above corner)22
- 21a Dorsal soft rays 14-16 (usually 15); auxiliary scales present on body; six, near-vertical, dark bars or double bars on body (one on nape, four beneath dorsal fin, and one on caudal peduncle); caudal fin and soft portions of dorsal and anal fins with numerous blackish spots; no dark brown dots on nape and anterodorsally on body (north-western Australia, Indonesia, south-east Asia, and Philippines)..... *E. sexfasciatus* (Valenciennes, 1828)
- 21b Dorsal soft rays 16; no auxiliary scales on body; dark bars, if present on body, faint; no blackish spots on caudal, dorsal, or anal fins; numerous dark brown dots on nape and anterodorsally on body (north-western Australia to South China Sea). *E. stictus*, new species
- 22a Vertical or near-vertical dark bars on body (faint or absent on some preserved *E. rivulatus*); auxiliary scales present on body; lateral-line scales 46-53 (except *fasciatus* with 50-58)23
- 22b No dark bars on body; auxiliary scales not present on body; lateral-line scales 53-69.....25
- 23a Scales on nape and anteriorly on body above lateral line very small; dorsal soft rays 16-18 (usually 17); each scale of body with a whitish dot (may not persist in preservative) (Indian Ocean and western Pacific)
.....*E. rivulatus* (Valenciennes, 1830)
- 23b Scales on nape and dorsoanteriorly on body not very small; dorsal soft rays 15-17 (rarely 17); each scale of body without a whitish dot24
- 24a Posterior nostril of adults about three times larger than anterior nostril; lateral-line scales 46-52; body depth 2.65-2.95 in SL; edges of dark bars on body with small black spots; outer part of membranes of spinous portion of dorsal fin not black or red (north-western Australia through Indonesia to Fiji and southern Japan) *E. amblycephalus* (Bleeker, 1857)
- 24b Nostrils subequal; lateral-line scales 50-58; body depth 2.9-3.3 in SL; no black spots on edges of dark bars or elsewhere on body; triangular outer part of membranes of spinous portion of dorsal fin black (or red in individuals from deep water) (Indian Ocean and western Pacific).....
..... *E. fasciatus* (Forsskal, 1775)
- 25a Lateral-line scales 53; numerous, close-set, dark spots larger than pupil on caudal fin and soft portion of dorsal fin (dark spots also present on soft portion of anal fin but mostly smaller than pupil); yellow spots on head and body in life (most evident on head) (north-western Australia)
..... *E. timorensis*, new species

- 25b Lateral-line scales 54-69; dark spots, if present on caudal and dorsal fins, smaller than pupil and not close-set; no yellow spots on head and body in life.26
- 26a Dorsal soft rays 16-17; lateral-line scales 67-69; longitudinal scale series 143-145; body depth about 2.45 in SL; uniform dark brown (north-western Australia)*E. trophis*, new species
- 26b Dorsal soft rays 13-15; lateral-line scales 54-66; longitudinal scale series 91-120; body depth 2.6-3.3 in SL; pale, with or without prominent dark markings on body27
- 27a Longitudinal scale series 91-95; lower-limb gill rakers 14-15; light brown with three longitudinal brown bands on head (two passing posteriorly from eye and one from upper edge of maxillary groove); no dark bands or spots on body or fins (north-western Australia and Indonesia to southern Japan)*E. heniochus* Fowler, 1904
- 27b Longitudinal scale series 100-120; lower-limb gill rakers 15-18; head with or without three longitudinal dark bands (if present, upper band bifurcate); dark bands or spots present on body.28
- 28a Nostrils subequal; pelvic fins short, 2.15-2.70 in head; no dark bands on body; upper half to two-thirds of body with very small dark brown spots (scattered in adults, in three longitudinal rows in juveniles and subadults) (Indian Ocean to western Pacific)*E. epistictus* (Temminck and Schlegel, 1842)
- 28b Posterior nostril larger than anterior in adults; pelvic fins not short, 1.8-2.15 in head; five, irregular, diagonal, dark brown bands on body (with age only the edges remain dark), the first from nape to eye, the last three broadly branching ventrally; small dark spots in one or two irregular rows in pale interspace between bands (Red Sea and Indian Ocean to western Pacific).*E. radiatus* (Day, 1867)

Epinephelus stictus sp. nov.

Figure 1; Table 1

Epinephelus diacanthus (non Valenciennes) Fourmanoir, 1965: 26, fig. 10 (Nha Trang, Viet Nam).

Epinephelus sp. Gloerfelt-Tarp and Kailola, 1984: 135, 325, lowermost fig. of p. 134 (north-western Australia).

Holotype

WAM P28277-001, 328 mm, Western Australia, about 20 km S of Heywood Shoals (13°33'S, 124°02'E), 138-142 m, trawl, R/V *Courageous* Sta. 50/1103, K. Sainsbury, 3 June 1979.

Paratypes

BM(NH) 1939.1.17.10, 170 mm, Hong Kong, donated by G.A.C. Herklots (no other data); ABE 10701, 252 mm, South China Sea, T. Abe; BPBM 30913, 231 mm, South China Sea, T. Abe; ZUMT 52224, 199 mm, South China Sea, T. Abe; CSIRO CA886, 131 mm, Western Australia, 15°32'S, 124°02'E, 61 m, trawl, R/V *Soela*, 18 July 1980.

Diagnosis

A species of *Epinephelus* characterised by the following combination of features: dorsal soft rays 16; anal soft rays 8; pectoral 18-20 (usually 19); lateral-line scales 48-51; longitudinal scale series 84-96; no auxiliary scales on body; caudal fin rounded; corner of preopercle with 1-4 (usually 2) enlarged serrae; eye large, the orbit diameter 4.0-4.8 in head; colour brown, sometimes with faint dark bars, with dark brown dots dorsally on head and anteriodorsally on body.

Description

Dorsal rays XI,16; anal rays III,8; pectoral rays 19 (18-20); pelvic rays I,5; principal caudal rays 17, the upper and lower unbranched; procurrent caudal rays 8 or 9; lateral-line scales 50 (48-51); longitudinal scale series 91 (84-96); scales above lateral line to origin of dorsal fin about 15; scales below lateral line to origin of anal fin about 39; circumpeduncular scales 38; gill rakers 7 + 14 (7-8 + 14-15); pseudobranchial filaments 49 (40-65); branchiostegal rays 7; pyloric caecae 12; predorsal bones 2; vertebrae 24.

Body moderately elongate, the depth 2.9 (2.9-3.35) in SL, and compressed, the width 1.75 (1.75-2.3) in depth; dorsal profile of head convex; head length 2.3 (2.25-2.35) in SL; eye large, the orbit diameter 4.65 (4.0-4.8) in head; snout 4.7 (4.1-4.8) in head; interorbital space flat, the least width 7.0 (6.9-7.6) in head;



Figure 1 *Epinephelus stictus*, holotype, 328 mm SL, 20 km south of Heywood Shoals, Western Australia (painting by R. Swainston).

Four new Serranid Fishes

Table 1 Proportional measurements of type specimens of *Epinephelus stictus* expressed as percentages of the standard length.

	Holotype	Paratypes				
	WAM P28277-001	CSIRO CA866	BM(NH) 1939.1.17.10	ZUMT 52224	BPBM 30913	Abe 10701
Standard length (mm)	328.0	131.0	170.0	199.0	231.0	252.0
Body depth	34.6	34.8	30.6	31.7	30.7	30.0
Body width	19.8	15.2	17.7	18.3	15.1	17.2
Head length	43.9	43.5	44.1	44.4	44.2	42.5
Snout length	10.7	9.3	9.8	9.5	9.4	8.9
Orbit diameter	9.4	10.8	9.2	9.6	9.4	9.2
Interorbital width	6.3	6.1	6.4	6.1	5.8	5.9
Suborbital depth	3.7	2.6	3.3	3.0	3.1	3.0
Upper jaw length	19.6	19.5	20.1	20.2	19.8	19.9
Caudal peduncle depth	11.2	10.5	11.2	10.8	11.1	11.0
Caudal peduncle length	16.7	16.8	15.1	16.6	15.8	15.1
Predorsal length	32.7	39.0	38.4	38.5	38.5	37.6
Preanal length	72.7	69.0	70.1	70.4	69.5	72.3
Prepelvic length	42.8	39.2	41.0	39.0	40.1	37.6
Length of dorsal fin base	56.8	57.0	54.5	58.7	56.5	54.8
Length of first dorsal spine	6.7	6.7	7.0	6.2	5.7	5.9
Length of second dorsal spine	11.2	12.2	12.9	11.4	11.4	10.7
Length of longest dorsal spine	13.6	14.8	14.6	13.7	13.0	13.2
Length of last dorsal spine	10.4	11.5	12.1	11.6	10.4	10.5
Length of longest dorsal ray	16.2	17.5	17.2	17.4	16.2	16.1
Length of anal fin base	15.8	15.2	17.3	15.9	16.8	16.0
Length of first anal spine	6.8	8.1	7.3	6.9	7.0	7.2
Length of second anal spine	12.1	14.9	15.2	14.6	14.5	13.9
Length of third anal spine	11.8	13.9	13.8	13.6	13.0	12.5
Length of longest anal ray	17.1	18.6	17.6	18.2	17.2	17.0
Caudal fin length	23.6	25.7	23.8	24.9	23.6	23.9
Pectoral fin length	22.8	25.0	24.7	24.1	23.4	23.4
Pelvic spine length	9.4	12.0	12.4	12.0	10.8	11.4
Pelvic fin length	17.1	20.2	19.6	18.7	18.0	17.1

suborbital depth 11.8 (13.5-16.5) in head; caudal peduncle depth 3.9 (3.85-4.2) in head, 1.5 (1.35-1.6) in peduncle length.

Mouth large, slightly oblique, forming an angle of about 20° to the horizontal, the maxilla reaching to or slightly posterior to rear edge of orbit, the upper jaw length 2.25 (2.15-2.25) in head; depth of maxilla about 2.8 in orbit diameter; a pair of moderately small canine teeth anteriorly in jaws, the gap between the upper pair contained about 2.8 times in orbit diameter; teeth of upper jaw mainly in three rows, the outer row of about 25 fixed teeth on each side longest and stoutest; band of teeth lingual to upper canines in five or six rows, the median inner teeth notably the longest; two rows of teeth along side of lower jaw, the inner row about twice as long as the outer and depressible; inner row of teeth

expanding to five or six rows anteriorly in lower jaw, the most medial of which extend into the symphyseal gap as far forward as the canines; villiform teeth in three or four irregular rows on vomer and palatines, those on vomer forming a V. Tongue moderately slender, the tip rounded. Longest gill raker on first gill arch at angle, its length clearly greater than longest gill filaments, 2.55 (2.5-2.6) in orbit diameter; no small bony platelets on side of gill arch. Nostrils small, subequal, in front of centre of eye, and close together; anterior nostril not tubular but with a well-developed membranous flap on its rear margin which just reaches or extends slightly beyond front edge of posterior nostril.

Opercle with three broad spines, the uppermost small, only slightly above base of middle spine, and difficult to detect; middle and lower spines very large, their tips about equally posterior and closer together than the distance from middle to upper spine; corner of preopercle with two to four (usually two) very large serrae, three or more times longer than largest upper preopercular serrae; ventral edge of preopercle smooth, the posterior margin with 40 (25-41) serrae; margins of subopercle and interopercle usually smooth (holotype with eight subopercular serrae and two interopercular serrae on one side, none on other); opercular membrane moderately pointed, the upper edge slightly convex.

Lateral line slightly arched over pectoral region, then paralleling contour of back to straight peduncular part; scales cycloid on head, thorax, abdomen, and anterodorsally on body, ctenoid elsewhere on body; no auxiliary scales on body; no scales on maxilla; very small scales extending about half way to outer margin of median and pectoral fins; a narrow band of very small scales on first two membranes of pelvic fins extending about two-thirds distance to outer margin.

Origin of dorsal fin over third or fourth lateral-line scales; membranes of spinous portion of dorsal fin moderately incised; first dorsal spine about half length of second spine; second dorsal spine contained about 1.2 times in third spine, third or fourth dorsal spines longest, 3.2 (2.95-3.4) in head; all dorsal and anal rays branched, the last to base; tips of posterior dorsal soft rays not reaching or just reaching a vertical through caudal-fin base; tips of posterior anal soft rays distinctly short of caudal-fin base; fifth or sixth dorsal soft rays longest, 2.7 (2.5-2.7) in head. Origin of anal fin below base of second dorsal soft ray; first anal spine 1.8 (1.85-2.1) in second spine; second anal spine slightly longer than third spine, 3.6 (2.8-3.05) in head; second or third anal soft ray longest, 2.55 (2.35-2.55) in head. Caudal fin rounded, 1.85 (1.7-1.85) in head. Pectoral fins not fleshy, the rays branched except the short uppermost and lowermost rays; seventh to ninth pectoral rays longest, 1.9 (1.75-1.9) in head. Origin of pelvic fins below lower pectoral-fin base; pelvic fins not approaching anus, 2.55 (2.15-2.5) in head.

Colour of holotype in alcohol light brown, slightly darker on head and dorsally on body, with numerous dark brown dots (average diameter 1.5 mm) middorsally on head (including snout), on nape, and anterodorsally on body; a dark line along base of dorsal fin (indistinct anteriorly); fins pale except margins of dorsal and anal fins and posteriorly on caudal fin which are blackish (best developed on

caudal fin where the breadth is 4-5 mm and least developed on anal fin where only the tips of the fifth to seventh rays are dark).

The 131- and 170- mm paratypes have five faint dark bars on body, broader than interspaces, which angle slightly forward as they pass ventrally; an intensification of pigment exists about half way down each bar, forming an irregular squarish blotch of dark brown; a brown band from posterior edge of preopercle at level of lower part of eye passing to rear of opercle, its edges at middle and lower opercular spines; fins light brown, the membranes lighter than rays, the triangular outer part of each interspinous membrane hyaline.

Gloerfelt-Tarp and Kailola (1984: 134-135) illustrated this species (as *Epinephelus* sp.) and gave the following colour note: "Olive-yellow, white below; top of head and back with many orange-brown spots, more numerous in larger fish; 5-6 faint broad darker bands across body; maxillary groove brown; a thin dark line along base of dorsal fin. Soft dorsal and caudal fin margins dark brown." Although Gloerfelt-Tarp and Kailola stated that the illustrated specimen was lost, it was found at the Western Australian Museum; we have designated it as the holotype of *E. stictus*.

Fourmanoir (1965: 26, Fig. 10) examined four specimens (misidentified as *E. diacanthus*) from Nha-Trang, Viet Nam. He noted the numerous brownish black dots dorsally on the head and body to the origin of the caudal peduncle; the brownish black opercular band which passes between the two lower opercular spines; three distinct lateral brown spots beneath dorsal spines I-IV, VII-X, and under the anterior part of the soft dorsal; indistinct oblique dark bars; maxilla, mandible, and all the lower region of the head and body rose red; border of anal fin violet, the distal part grey-rose, the base olive; lower caudal rays violet.

Remarks

The most important colour character by which this grouper can be identified is the sprinkling of dark brown dots on the upper part of the head and dorso-anteriorly on the body. We have named it *stictus* from the Greek *stiktos*, meaning punctured or spotted, in reference to these tiny spots.

The specimens of this species have come from two areas, north-western Australia and the South China Sea, one in the Northern Hemisphere and the other in the Southern, the two broadly separated by Indonesia. As it has been taken by trawling, it may be primarily a continental shelf species less apt to be caught in insular regions with limited trawling grounds. Nevertheless, we expect that it will ultimately be found in the Indonesian region. The two depth records we have for *E. stictus*, 61 m and 138-142 m, indicate that it is a species of moderately deep water, which partly explains the paucity of specimens.

E. stictus appears to be most closely related to *E. diacanthus* Valenciennes, which occurs from Sri Lanka to Oman, and to *E. sexfasciatus* Valenciennes, which ranges from north-western Australia to the Philippines. Characters shared by the three species include the presence of 1-4 (usually 2) very large, serrae

at the corner of the preopercle, similar fin ray counts, and a similar pattern of dark bars on the body (faint or absent in *E. stictus*). They also show a predilection for deeper water and are often taken by trawling, hence they must occur on open sedimentary substrata. *Epinephelus stictus* differs from the others in lacking auxiliary scales on the body and in having a distinctive colour pattern of dark dots. *Epinephelus diacanthus* has a higher lateral-line scale count (52-60) than *E. stictus* and small scales on the maxilla; *E. sexfasciatus* usually has 15 instead of 16 dorsal soft rays, and it has black spots on the median fins.

Epinephelus timorensis sp. nov.

Figure 2; Table 2

Holotype

WAM P24794-001, 141 mm SL, Timor Sea, Western Australia, Dillon Shoals (11°S, 124°E), base of drilling rig, 130 m, L. Harris. 25-28 May 1974.

Diagnosis

A species of *Epinephelus* characterised by the following combination of features: Dorsal soft rays 16; anal soft rays 8; pectoral rays 17; lateral-line scales 53, each with a single tube; longitudinal scale series 108; caudal fin rounded; corner of preopercle with 3 enlarged serrae; colour blue-grey with yellow spots smaller than pupil on head and body, faint dark spots larger than pupil posteriorly on body, close-set dark spots mostly larger than pupil on caudal fin and soft portions of dorsal and anal fins.

Description

Dorsal rays XI,16; anal rays III,8; pectoral rays 17; pelvic rays I,5; principal caudal rays 17, the upper and lower unbranched; procurrent caudal rays 10; lateral-line scales 53; longitudinal scale series 108; scales above lateral line to origin of dorsal fin 18; scales below lateral line to origin of anal fin 32; circumpeduncular scales 48; gill rakers 9 + 15; pseudobranchial filaments 48; branchiostegal rays 7; pyloric caecae 14; predorsal bones 2; vertebrae 24.

Body moderately deep, the depth 2.7 in SL, and compressed, the width 2.1 in depth; dorsal profile of head convex with a slight indentation dorsoanterior to eye; head length 2.65 in SL; snout length 3.8 in head; eye relatively small, the orbit diameter 4.9 in head; interorbital space convex, the least width 5.25 in head; suborbital depth 10.8 in head; caudal peduncle depth 3.15 in head, 1.5 in peduncle length.

Mouth oblique, forming an angle of about 45° to the horizontal, the maxilla nearly reaching a vertical at rear edge of orbit, the upper jaw length 2.15 in head; depth of maxilla 1.7 in orbit diameter; a pair of moderate canines anteriorly in upper jaw separated by a gap which is contained 2.6 times in orbit diameter; a



Figure 2 *Epinephelus timorensis*, holotype, 141 mm SL, Dillon Shoals, Western Australia.

pair of smaller canine teeth anteriorly in lower jaw, medial to the uppers when mouth is closed; a series of about 20 slender, fixed, incurved, conical teeth on each side of jaws posterior to canines; upper jaw with a band of villiform teeth, much broader anteriorly, the inner medial teeth as long as canines but more slender; side of lower jaw with an inner row of slender, depressible, conical teeth about twice as long as outer row; a band of small depressible teeth anteriorly in lower jaw lingual to canines, the innermost elongate; a band of villiform teeth on palatines and vomer, forming a V-shape on vomer. Tongue slender, the upper surface somewhat rugose. Longest gill raker (at angle) longer than longest gill filament on first gill arch, its length half orbit diameter; small bony platelets on side of first two gill arches, one or two in each space between gill rakers. Nostrils small, subequal, the anterior a short membranous tube with an elevated posterior flap directly anterior to upper edge of pupil, a pupil diameter anterior to orbit; posterior nostril diagonally above and behind the anterior, without a rim.

Opercle with three flat spines, the upper obtuse and poorly defined; middle opercular spine the most posterior, equidistant to upper and lower spines on one side and slightly closer to lower spine on the other; opercular membrane pointed, the upper margin slightly angular above upper opercular spine, then nearly straight; ventral margin of preopercle fleshy, the posterior margin with 36 serrae, the corner with three enlarged serrae; margins of subopercle and interopercle partially serrate.

Table 2 Proportional measurements of the holotype of *Epinephelus timorensis* expressed as percentages of the standard length.

WAM P24794-001	
Standard length (mm)	141.0
Body depth	37.2
Body width	17.6
Head length	37.9
Snout length	9.9
Orbit diameter	7.7
Interorbital width	7.2
Suborbital depth	3.5
Upper jaw length	17.6
Caudal peduncle depth	12.1
Caudal peduncle length	18.1
Predorsal length	33.6
Preanal length	67.4
Prepelvic length	54.0
Length of dorsal fin base	55.3
Length of first dorsal spine	5.9
Length of second dorsal spine	11.3
Length of longest dorsal spine	13.5
Length of last dorsal spine	12.0
Length of longest dorsal ray	12.9
Length of anal fin base	17.0
Length of first anal spine	5.3
Length of second anal spine	11.1
Length of third anal spine	11.3
Length of longest anal ray	17.4
Caudal fin length	24.1
Pectoral fin length	23.5
Pelvic spine length	11.1
Pelvic fin length	20.3

Lateral line slightly arched over pectoral region, then following upper contour of body to straight peduncular portion; scales finely ctenoid on body, cycloid on head, nape, and thorax (largely missing from abdomen); auxiliary scales not present on body, but a few apparent on nape; most of maxilla above upper lip covered with very small scales; very small scales extending onto median fins about three-fourths distance to outer margins, about half distance on pelvic fins, and one-fourth distance on pectorals.

Origin of dorsal fin over third lateral-line scale; membranes of spinous portion of dorsal fin moderately incised; first dorsal spine about half length of second; second dorsal spine 1.2 in length of third spine; fourth dorsal spine longest, slightly longer than third and fifth spines, 2.8 in head length; all dorsal and anal rays branched, the last to base; fourth dorsal ray longest, 2.95 in head; posterior ends of dorsal and anal rays not reaching a vertical of caudal-fin base. Origin of anal fin below base of second dorsal soft ray; first anal spine about half length

of second; third anal spine slightly longer than second, 3.35 in head; fourth and fifth anal rays longest, 2.2 in head. Caudal fin slightly rounded, the uppermost branched rays slightly produced, the fin length 1.55 in head. Pectoral fins not fleshy; all pectoral rays branched except short uppermost ray; middle pectoral rays longest, 1.6 in head. Origin of pelvic fins below lower base of pectoral fins; pelvic fins short, not approaching anus, 1.85 in head.

Colour in alcohol brown, slightly paler ventrally, with pale spots smaller than pupil dorsally on head from snout to nape; median fins light brown, the spinous portion of dorsal fin with a narrow blackish margin, the soft portion with three rows of brown spots, larger than pupil, posteriorly on soft portion; caudal fin with numerous, close-set, brown spots the size of pupil or larger; pectoral fins pale; pelvic fins with pale membranes and dusky brown rays.

Colour when fresh blue-grey with small yellow spots on head and body; some faint dark spots larger than pupil posteriorly on body.

Remarks

This small grouper is known only from the single type specimen taken in 130 m from the base of an experimental drilling rig at Dillon Shoals in the Timor Sea. It is named *timorensis* in reference to the type locality.

E. timorensis appears to be most closely related to another yellow-spotted, deep-dwelling grouper from the Samoa Islands, Phoenix Islands, and Fiji that remains undescribed; it is currently under study by the senior author and Phillip C. Heemstra. The two species share the same meristic data except that *E. timorensis* has 53 lateral-line scales compared to 50 or 51 for the other species. The latter differs notably from *timorensis* in having a slightly emarginate caudal fin and a more elongate body (depth 2.8-3.3 in SL, compared to 2.7 for *timorensis*).

Epinephelus trophis sp. nov.

Figure 3; Table 3

Holotype

WAM P24795-001, 104.5 mm, Timor Sea, Western Australia, Dillon Shoals (11°S, 124°E), base of drilling rig, 130 m, L. Harris, 25-28 May 1974.

Paratype

BPBM 30279, 125 mm, same data as holotype.

Diagnosis

A species of *Epinephelus* characterised by the following combination of features: dorsal soft rays 16 or 17; anal soft rays 8; pectoral rays 17-18; caudal fin rounded; lateral-line scales 67-69, each with a single tube; longitudinal scale series 143-145; corner of preopercle with 2-3 enlarged serrae; body depth 2.45 in SL; colour uniform dark brown.

Description

Dorsal rays XI,17 (16); anal rays III,8; pectoral rays 18 (17); pelvic rays I,5; principal caudal rays 17, the upper and lower unbranched; procurrent caudal rays 10 or 11; lateral-line scales 69 (67); longitudinal scale series 145 (143); scales above lateral line to origin of dorsal fin about 38; scales below lateral line to origin of anal fin about 77; circumpeduncular scales about 65; gill rakers 10 + 16 (10 + 15); pseudobranchial filaments 44 (43); branchiostegal rays 7; pyloric caecae about 35; predorsal bones 2; vertebrae 24.

Body very deep, the depth 2.45 in SL, and compressed, the width 2.2 in depth; dorsal profile of head convex with a slight indentation dorsoanterior to eye; head length 2.4 (2.5) in SL; snout length 3.95 (3.85) in head; eye relatively small, the orbit diameter 5.35 (5.45) in head; interorbital space convex, the least width 5.25 (4.9) in head; suborbital depth 10.5 (10.0) in head; caudal peduncle depth 3.35 (3.4) in head, 1.35 (1.4) in peduncle length.

Mouth oblique, forming an angle of about 55° to the horizontal, the maxilla reaching or extending slightly beyond a vertical through centre of eye, the upper jaw length 2.0 (2.1) in head; depth of maxilla 1.3 (1.4) in orbit diameter; a pair of moderate, incurved, canine teeth anteriorly in upper jaw separated by a gap which is contained 2 times in orbit diameter; a pair of similar canines at front of lower jaw which are medial to uppers when mouth closed; a series of about 18, slender, incurved, conical teeth on each side of upper jaw posterior to canines, with an inner band of small, depressible, villiform teeth medial to the outer row,



Figure 3 *Epinephelus trophis*, holotype, 104.5 mm SL, Dillon Shoals, Western Australia.

Table 3 Proportional measurements of type specimens of *Epinephelus trophis* expressed as percentages of the standard length.

	Holotype WAM P24793-001	Paratype BPBM 30279
Standard length (mm)	104.5	125.0
Body depth	41.8	40.7
Body width	18.4	18.3
Head length	41.7	40.1
Snout length	10.5	10.4
Orbit diameter	7.8	7.4
Interorbital width	7.9	8.2
Suborbital depth	4.0	4.0
Upper jaw length	21.0	20.5
Caudal peduncle depth	12.1	12.0
Caudal peduncle length	15.9	16.0
Predorsal length	35.4	34.8
Preanal length	74.8	76.0
Prepelvic length	42.7	43.6
Length of dorsal fin base	56.4	57.1
Length of first dorsal spine	6.4	6.3
Length of second dorsal spine	11.9	12.0
Length of longest dorsal spine	14.3	14.0
Length of last dorsal spine	12.4	12.2
Length of longest dorsal ray	16.3	16.2
Length of anal fin base	16.1	16.0
Length of first anal spine	5.4	5.3
Length of second anal spine	11.9	12.0
Length of third anal spine	12.5	12.3
Length of longest anal ray	18.4	18.2
Caudal fin length	23.6	23.7
Pectoral fin length	21.6	20.7
Pelvic spine length	12.5	12.6
Pelvic fin length	20.8	20.5

this band much broader anteriorly where the most medial and inner teeth are very large (some longer than canines); front of lower jaw lingual to canines with three irregular rows of slender conical teeth, continuing as two rows along side of jaw, the teeth of the inner row depressible and about twice as long as those of outer row; a narrow band of two or three irregular rows of villiform teeth on vomer and palatines, those on vomer forming a V. Tongue slender and narrowly rounded at tip, the upper surface finely ridged. Longest gill raker (at angle) equal in length to longest gill filament on first gill arch, 1.7 in orbit diameter; a small bony platelet in each space between bases of gill rakers on first gill arch. Nostrils small, subequal, the anterior a membranous tube with posterior flap, lying directly in front of upper edge of pupil by a distance equal

to one-third orbit diameter; posterior nostril elliptical without a fleshy rim, lying in line between anterior nostril and upper edge of orbit, the distance between nostrils contained 7-8 times in orbit diameter.

Opercle with three flat spines, the upper obtuse and not conspicuous, middle opercular spine the most posterior and closer to lower than upper spine; opercular membrane pointed, the upper edge angular above upper opercular spine, then nearly straight; ventral margin of preopercle fleshy, the upper margin with 26 serrae which are progressively larger ventrally, the corner with two or three enlarged serrae; margins of subopercle and interopercle smooth or with a few small serrae.

Lateral line slightly arched over pectoral region, then paralleling contour of back to straight peduncular portion; scales cycloid on head, anterodorsally on body, on thorax and abdomen, finely ctenoid elsewhere; auxiliary scales not present on body; a few very small embedded scales on maxilla of holotype (present on most of upper half of maxilla of paratype); very small scales on median fins extending about three-fourths distance to outer margin, about one-third on pectoral fins, and in a narrow band about half way to outer margin on each pelvic membrane.

Origin of dorsal fin above third lateral-line scale; membranes of spinous portion of dorsal fin slightly incised; first dorsal spine 1.85 (1.9) in second spine; second dorsal spine 1.2 (1.15) in fourth spine; fourth dorsal spine longest, 2.9 (2.85) in head; all dorsal and anal rays branched, the last to base; tips of posterior dorsal and anal soft rays not reaching a vertical at caudal-fin base (dorsal rays nearly reaching caudal base in paratype); fourth to sixth dorsal soft rays longest, 2.55 (2.5) in head. Origin of anal fin below base of fifth dorsal soft ray; first anal spine 2.2 in second spine; third anal spine slightly longer than second, 3.35 (3.3) in head; third or fourth anal soft ray longest, 2.25 (2.2) in head. Caudal fin slightly rounded, 1.75 (1.7) in head. Pectoral fins not fleshy; all pectoral rays branched except short uppermost ray; seventh to ninth pectoral rays longest, 1.95 in head. Pelvic fins not approaching anus, 2.0 (1.95) in head.

Colour of holotype in alcohol uniform dark brown, a little paler ventrally; median fins coloured like body, the margins of the soft portions of the dorsal and anal fins and the posterior edge of the caudal fin narrowly pale; pectoral fins pale; pelvic fins blackish.

The paratype is coloured like the holotype except for a broad submarginal part of the caudal fin and the posterior soft portions of the dorsal and anal fins which are darker brown.

The holotype when fresh was recorded as "charcoal coloured".

Remarks

Only two specimens of this grouper were obtained; they were collected from the same Dillon Shoals locality and 130 m depth as the holotype of *E. timorensis*. They appear to be immature.

The species is named *trophis* from the Greek meaning well-fed and plump, in reference to its robust body. Its body depth is equalled only by occasional specimens of *E. cyanopodus*, *E. flavocaeruleus*, and *E. multinotatus*. It is also distinctive in its high scale counts and uniform dark brown colouration. It does not seem to be closely related to any known species of the genus.

Epinephelus bilobatus sp. nov.

Figure 4; Tables 4-6

Epinephelus maculatus (non Bloch) Allen, 1985: 2301, fig. 121 (Rosemary Island, Dampier Archipelago).

Holotype

WAM P25119-008, 156 mm, Western Australia, Dampier Archipelago, Rosemary Island (20°28'S, 116°36'E), 4 m, rotenone, G.R. Allen and R.C. Steene, 18 November 1974.

Paratypes

WAM P14924-001, 101 mm, Western Australia, Yampi Sound (16°8'S, 123°36'E), A. Robinson, 14 September 1959; BPBM 31041, 99.5 mm, same data as preceding; WAM P14948-001, 79.5 mm, Western Australia, Port Wolcott (20°39'S, 117°11'E), 14 m, R.D. Royce, 3 June 1960; WAM P24358-001, 238 mm, Western Australia, Dampier Archipelago, Kendrew Island (20°29'S, 116°32'E), spear, J.B. Hutchins, 22 November 1974.

Diagnosis

A species of *Epinephelus* characterised by the following combination of features: dorsal soft rays 17-18 (usually 17); anal soft rays 8; pectoral rays 17-19; lateral-line scales 49-52; longitudinal scale series 94-102; auxiliary scales present on body; caudal fin rounded; longest dorsal spine (third) 2.05-2.3 in head; pectoral fins not long, 1.5-1.75 in head; head, body, and fins with numerous dark brown spots of moderate size, those on pectoral fins about size of pupil; three, large, bilobed, dark brown spots or close-set pairs of spots along base of dorsal fin.

Description

Dorsal rays XI, 17 (17-18, only one paratype with 18); anal rays III, 8; pectoral rays 17 (17-19); principal caudal rays 17, the upper and lower unbranched; precurrent caudal rays 9; lateral-line scales 51 (49-52); longitudinal scale series 94-102; scales above lateral line to origin of dorsal fin about 17; scales below lateral-line to origin of anal fin about 46; circumpeduncular scales 39 (39-43); gill rakers 8 + 15 (7-9 + 14-16); pseudobranchial filaments 50 (32-69, increasing with size); branchiostegal rays 7; predorsal bones 2; vertebrae 24; pyloric caecae 23 (holotype).

Body moderately elongate, the depth 2.9 (2.85-3.25) in SL, and compressed, the width 2.3 (1.85-2.5) in depth; dorsal profile of head slightly convex; head length 2.45 (2.45-2.50) in SL; snout length 4.5 (3.85-5.05) in head; orbit diameter

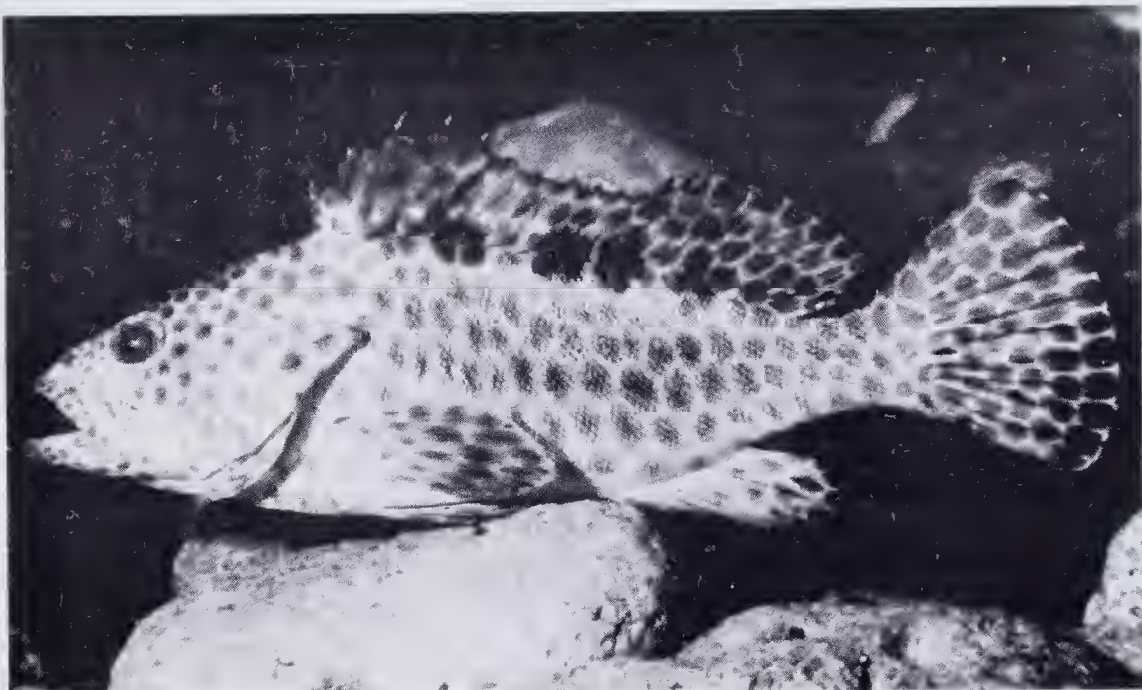


Figure 4 *Epinephelus bilobatus*, holotype (freshly dead, photographed underwater), 156 mm SL, Rosemary Island, Dampier Archipelago, Western Australia.

4.95 (4.35-5.65) in head; interorbital space slightly convex, the least width 6.45 (6.45-7.0) in head; suborbital depth 10.5 (9.2-13.5) in head; caudal peduncle depth 3.25 (3.35-3.55) in head, 1.5 (1.50-1.65) in peduncle length.

Mouth large, slightly oblique, forming an angle of about 20° to the horizontal, the maxilla nearly reaching or just reaching a vertical at posterior edge of orbit, the upper jaw length 2.2 (2.1-2.2) in head; depth of maxilla 1.75 (1.4-1.9) in orbit diameter; a pair of moderately large canine teeth anteriorly in jaws, the gap between the upper pair contained 2.5 times in orbit of holotype; upper jaw of holotype with an outer row of 27 slender, incurved, fixed, conical teeth and an inner band of depressible villiform teeth which consists of four or five rows anteriorly and narrows to a single row posteriorly (the median inner teeth of this band anteriorly in jaw as long as upper canines); lower jaw with two rows of slender, recurved and incurved conical teeth for most of its length, expanding to four rows anteriorly in jaw, the teeth of the inner row nearly twice as long as those of the outer and depressible; vomer with a V-shaped band of villiform teeth in four or five irregular rows; palatines with a band of villiform teeth in from two to five irregular rows. Tongue slender, the tip rounded, Longest gill raker (at angle) clearly longer than longest filament of first gill arch, 1.5 (1.3-1.95) in orbit diameter; a small bony platelet between bases of gill rakers on first arch (sometimes two on upper-limb, but none at rakers next to angle).

Nostrils small, subequal or the posterior slightly larger, in front of or slightly above centre of eye; anterior nostril a short membraneous tube with a posterior flap which reaches beyond front edge of posterior nostril.

Table 4 Proportional measurements of type specimens of *Epinephelus bilobatus* expressed as percentages of the standard length.

Character	Holotype	Paratypes			
	WAM P25119-008	WAM P14948-001	BPBM 31041	WAM P14924-001	WAM P24358-001
Standard length (mm)	156.0	79.5	99.5	101.0	238.0
Body depth	34.6	35.2	32.0	30.7	32.3
Body width	15.1	14.2	14.0	14.5	17.5
Head length	40.5	39.8	39.7	40.6	40.7
Snout length	9.0	7.9	9.1	10.4	10.6
Orbit diameter	8.2	9.2	8.7	8.7	7.2
Interorbital width	6.3	5.7	5.8	5.8	6.3
Suborbital depth	3.8	2.9	3.3	3.6	4.4
Upper jaw length	18.5	18.9	18.0	19.0	18.5
Caudal peduncle depth	12.4	11.3	11.1	11.9	12.2
Caudal peduncle length	18.9	18.6	18.2	18.4	18.3
Predorsal length	36.0	36.9	35.0	34.9	34.1
Preanal length	65.5	66.2	68.1	68.0	69.4
Prepelvic length	39.5	42.2	42.5	42.5	43.5
Length of dorsal fin base	61.0	60.8	59.1	58.5	58.0
Length of first dorsal spine	8.5	9.5	8.6	9.8	8.3
Length of second dorsal spine	15.6	abnormal	16.2	16.3	15.1
Length of longest dorsal spine	18.0	18.8	19.0	19.8	17.7
Length of last dorsal spine	12.5	13.8	13.4	13.7	12.6
Length of longest dorsal ray	16.4	17.8	17.1	17.6	15.9
Length of anal fin base	18.5	17.7	18.1	18.6	17.6
Length of first anal spine	8.0	8.8	7.9	8.8	6.8
Length of second anal spine	15.1	16.3	15.7	16.8	11.8
Length of third anal spine	15.4	14.6	14.9	15.7	12.4
Length of longest anal ray	19.7	20.5	19.6	20.2	16.9
Caudal fin length	26.1	26.4	24.8	26.9	24.3
Pectoral fin length	25.7	26.8	26.2	26.4	23.3
Pelvic spine length	12.8	13.9	13.9	14.2	11.4
Pelvic fin length	21.4	22.4	22.3	22.8	19.4

Table 5 Counts of dorsal soft rays of *Epinephelus maculatus* and *E. bilobatus*.

Species	Dorsal soft rays			
	15	16	17	18
<i>E. maculatus</i>	2	11	2	
<i>E. bilobatus</i>			5	1

Table 6 Gill-raker counts of *Epinephelus maculatus* and *E. bilobatus*.

Species	Upper-limb rakers				Lower-limb rakers				Total gill rakers					
	7	8	9	10	14	15	16	17	22	23	24	25	26	27
<i>E. maculatus</i>		4	8	3		3	11	1		2	3	7	2	1
<i>E. bilobatus</i>	1	3	2		2	3	1		2	2	2			

Opercle with three, broad, flat spines, the uppermost inconspicuous and distinctly anterior to the other two; middle opercular spine largest and most posterior, its tip nearer lower than upper spine; three or four serrae at corner of preopercle slightly enlarged, the longest about twice as long as largest serrae just above corner; posterior preopercular margin with a slight concavity above corner and 34 (28-40) serrae, increasing with size; ventral preopercular margin smooth; margins of subopercle and interopercle smooth; opercular membrane pointed, the upper margin nearly straight.

Lateral line slightly arched over pectoral fin, then following contour of back to straight peduncular portion; scales cycloid on head, thorax, and anterodorsally on body, ctenoid elsewhere; auxiliary scales present on body (best developed on largest paratype); a long triangular band of very small scales on maxilla; very small scales extending more than three-fourths distance to margins of median and pelvic fins and about half way on pectoral fins.

Origin of dorsal fin over third lateral-line scale; membranes of dorsal fin moderately incised; first dorsal spine about half length of second; second dorsal spine contained 1.15 (1.15-2.0) in third dorsal spine; third dorsal spine longest, 2.25 (2.05-2.3) in head; all dorsal and anal soft rays branched, the last to base; tips of posterior dorsal and anal soft rays not reaching base of caudal fin; fifth or sixth dorsal soft rays longest, 2.45 (2.25-2.55) in head. Origin of anal fin below base of second dorsal soft ray; first anal spine about half length of second spine; second and third anal spines subequal, the longest 2.6 (2.45-3.25) in head; third or fourth anal soft rays longest, 2.05 (1.95-2.4) in head. Caudal fin rounded, 1.55 (1.5-1.65) in head. Pectoral fins not fleshy, all rays branched except short uppermost ray; ninth pectoral ray longest, 1.55 (1.5-1.75) in head. Origin of pelvic fins below lower base of pectorals, their length 1.9 (1.8-2.1) in head.

Colour of holotype in alcohol light brown with numerous, close-set, dark brown spots the size of pupil or slightly larger in six rows on deepest part of body and four rows on caudal peduncle; head with similar spots posteriorly, but progressively smaller ones anteriorly; a close-set pair of dark brown spots as large as eye, half on back and half extending into base of dorsal fin, between ninth dorsal spine and fourth dorsal soft ray; a similar but less prominent pair of spots between third and seventh dorsal spines, and a third, fainter pair between sixth and thirteenth dorsal soft rays (better developed on paratypes); fins with close-set, round to

polygonal, dark brown spots except first five interspinous membranes of dorsal fin which are largely covered with a dark brown area.

The ground colour of the holotype when fresh was pale bluish, shading ventrally to whitish, and the spots orange-brown; the narrow interspaces among the spots on the dorsal and caudal fins were pale blue, on the pectoral fins whitish, and on the anal and pelvic fins blue.

Remarks

The holotype was illustrated in colour by Allen (1985: fig 121).

We have named this species *Epinephelus bilobatus* in reference to its most characteristic colour markings, a series of three bilobed or close-set pairs of dark brown spots along the base of the dorsal fin.

A sixth specimen of *E. bilobatus*, CSIRO CA1972, 115 mm SL, was collected at Monte Bello Islands (20°30'S, 115°41'E) in December 1979. It was sent on loan by the Division of Fisheries and Oceanography, Commonwealth Science and Industrial Research Organisation, Hobart. Unfortunately the specimen has been lost. Meristic data from it, however, are included in the description above.

All of our specimens have come from Western Australia between latitudes 16°8' and 20°39'S. *E. bilobatus* is a shallow-water species of coral reefs or rocky bottom.

This species is closely related to *E. maculatus* (Bloch) which occurs from southern Japan south to the Great Barrier Reef and east to the Marshall Islands and Samoa Islands. It differs from *maculatus* in usually having 17 instead of 16 dorsal soft rays (see Table 5), fewer gill rakers (Table 6), fewer scales in longitudinal series (97-102, in contrast to 103-120 for *maculatus*), longer dorsal spines, the longest 2.05-2.3 in head (compared to 2.2-2.7 for *maculatus*) and in colour. *E. maculatus* lacks the series of large dark spots along the dorsal-fin base; it has instead two large blackish areas in the fin, one anteriorly on the spinous portion and one centred at the origin of the soft portion.

Acknowledgements

We thank Tokiharu Abe, Masahiro Aizawa, Lynn Harris, Patricia J. Kailola, Peter Last and Thomas Gloerfelt-Tarp for the collection and/or loan of specimens. Arnold Y. Suzumoto took the radiographs, and Phillip C. Heemstra and Douglass F. Hoese reviewed the manuscript.

References

- Allen, G.R. (1985). Fishes of Western Australia. *Pacific Marine Fishes*, Book 9: 2205-2534. TFH Publications, Neptune City, New Jersey.
- Allen, G.R. and Russell, B.C. (1986). Part VII. Fishes. Faunal surveys of the Rowley Shoals, Scott Reef, and Seringapatam Reef, North-western Australia (P.F. Berry ed.) *Rec. West. Aust. Mus. Suppl.* No. 25: 79-103.

- Fourmanoir, P. (1965). Liste complementaire des poissons marine de Nha-Trang. *Cahier O.R.S. T.O.M.* No. spec., pp. 114.
- Gloerfelt-Tarp, T. & Kailola, P.J. (1984). *Trawled Fishes of Southern Indonesia and North-western Australia*. The Australian Development Assistance Bureau, Australia; The Directorate General of Fisheries, Indonesia; and the German Agency for Technical Cooperation, Federal Republic of Germany, pp. 406.
- Kyushin, K., Amaoka, K., Nakaya, K. & Ida, H. (1977). *Fishes of Indian Ocean*. Japan Marine Fishery Resource Research Center, Tokyo, pp. 392.
- Randall, J.E. (1987). A preliminary synopsis of the groupers (Perciformes: Serranidae: Epinephelinae) of the Indo-Pacific region. In: J.J. Polovina and S. Ralston (eds), *Tropical Snappers and Groupers: Biology and Fisheries Management*. Westveiw Press, Boulder and London, pp. 659.
- Sainsbury, K.J., Kailola, P.J. & Leyland, G.G. (1984). *Continental Shelf Fishes of Northern and North-Western Australia*. CSIRO Division of Fisheries Research, Canberra, pp. 375.